REMARKS

The amendments to claims 1 and 5 were discussed during a telephone interview with Examiner Smith on October 31, 2007. The amendments to step (c) of claims 1 and 5 ("applying a negative voltage ... applying a positive voltage...")are supported on page 12, lines 2 to 8 of the specification and FIGS. 3A and 3B. During said telephone interview, the amendments to claims 1 and 5 set forth in the above "Listing of Claims" were discussed. During said telephone interview, the Wei and Yokoyama et al. patents were discussed.

Applicants' present claim 1 is directed to a chemical treatment method comprising:

(a) providing a material comprising a first metal film formed on a substrate and a second metal film formed on said first metal film, said first metal film being formed from a metal selected from the group consisting of chromium, titanium, tungsten, palladium and molybdenum, or an alloy thereof;

(b) forming a predetermined pattern on the second metal film by selectively removing a portion of the second metal

film, whereby an exposed portion of the first metal film from which the portion of the second metal film which is removed is passivated to form a passivated portion;

(c) immersing said material and a positive electrode in an acidic reduction treatment solution containing an acid radical and performing an electrolysis reduction process by applying a negative voltage to said material and applying a positive voltage to said positive electrode, whereby nascent hydrogen reduces said passivated portion to said first metal film; and

(d) etching the first metal film by contacting the exposed portion with an acidic etching treatment solution to form the predetermined pattern on the first metal film.

Applicants' present claim 5 relates to a chemical treatment method comprising:

(a) providing a material comprising a first metal film formed on a substrate and a second metal film formed on said first metal film, said first metal film being formed from a metal selected from the group consisting of

chromium, titanium, tungsten, palladium and molybdenum, or an alloy thereof;

(b) forming a predetermined pattern on the second metal film by selectively removing a portion of the second metal film, whereby an exposed portion of the first metal film from which the portion of the second metal film which is removed is passivated to form a passivated portion;

(c) immersing said material and a positive electrode in a reduction treatment solution containing a halogen ion and performing an electrolysis reduction process by applying a negative voltage to said material and applying a positive voltage to said positive electrode, whereby nascent hydrogen reduces said passivated portion to said first metal film; and

(d) dipping said material into an acidic etching treatment solution so that the exposed portion is in contact with said acidic etching treatment solution to form the predetermined pattern on the first metal film.

Claims 1, 2, 4 to 7, 9 to 10, 25, 27 and 36 to 45 were rejected under 35 USC 103 as being unpatentable over USP 4,350,564 to Wei in view of USP 6,294,467 to Yokoyama et

al. for the reasons set forth in item nos. 3 to 9 on pages 2 to 3 of the September 28, 2007 Office Action.

It was admitted in the Office Action that Wei does not explicitly disclose a positive electrode that is separate from a material.

It is respectfully submitted that Wei and Yokohama et al. fail to teach "(c) immersing said material and a positive electrode in an acidic reduction treatment solution containing an acid radical and performing an electrolysis reduction process by applying a negative voltage to said material and applying a positive voltage to said positive electrode, whereby nascent hydrogen reduces said passivated portion of said first metal film and (d) etching the first metal film by contacting the exposed portion with an acidic etching treatment solution to form the predetermined pattern on the first metal film" as recited in applicants' present claim 1.

Wei (USP 4,350,564) teaches that a method of etching a desired pattern in a thin film of chromium deposited on a substrate. As described in column 2, line 46 to column 3, line 15 of Wei, a layer 16 of silicon dioxide about 1000

Angstroms thick is formed on a layer 15. A thin film 18 of chromium about 75 Angstroms thick is deposited on the exposed surface of the silicon dioxide layer 16 to provide the composite structures shown in FIG. 3A. A layer 19 of a material which is resistant to the etching action of hydrochloric acid is deposited over the exposed surface of the thin film 18 of chromium as shown in FIG. 3B.

After exposing and developing of the layer of photoresist to provide a pair of retained portions 19a and 19b thereof in Wei, a thin layer 21 of aluminum about 150 Angstroms thick is sputtered on the exposed surfaces of the resultant assembly including the portion of 18a of the surface of the thin film of chromium 18 exposed by the aperture or pattern 22 formed in the layer 19 of photoresist and also on the exposed surfaces of the retained portions 19a and 19b of the photoresist as shown in FIG. 3C of Wei. Stated differently, the immersion in Wei makes the pattern of chromium as shown in Fig. 3D.

The resultant structure of Wei is then immersed in a dilute solution of hydrochloric acid consisting of one part of concentrated hydrochloric acid to one part of glycerine

by volume for about 30 seconds until the portion 21a of the aluminum deposited on the surface 18a of the thin film of chromium and the portion of the chromium film lying thereunder are completely removed, as shown in FIG. 3D of Wei. Stated differently, the immersion in Wei makes the pattern of chromium as shown in FIG. 3D.

As shown in FIG. 3C of Wei, a thin layer 21 of aluminum is sputtered on the exposed surfaces of the resultant assembly including the portion 18a of the surface of the thin film of chromium 18 exposed by the aperture of pattern 22 formed in the layer 19 of photoresist. Thus, there is no passivated portion of the chromium 18 in Wei.

As described above, Wei is silent concerning a wet etching process, an electrolysis reduction process and an acid dip process.

However, Wei fails to teach (c) immersing said material (100) and a positive electrode (22) in an acidic reduction treatment solution (24) containing an acid radical and performing an electrolysis reduction process by applying a negative voltage to said material (100) and applying a positive voltage to said positive electrode (22), whereby

nascent hydrogen reduces said passivated portion to said first metal film.

In contrast to Wei, according to applicants' present claims, the positive electrode and the material formed of the substrate, the first metal layer and the second metal layer and used as the negative electrode are immersed in an acidic reduction treatment solution to perform an electrolysis reduction process.

Wei also fails to teach (d) etching the first metal film (120) by contacting the exposed portion with an acidic etching treatment solution to form a predetermined pattern on the first metal film (120).

Yokoyama et al. (USP 6,294,467 B1) teach merely an anode electrode 8 that is separated from a material. The metal oxide film 7a is reduced to a metal film 7d (see column 5, line 55 to column 6, line 3 of Yokoyama et al.). However, the material does not include a second metal film. The material consists of the substrate 1, the lower layer wiring 2, the first interlayer insulating film 3, and the second interlayer insulating film 4.

It is therefore respectfully submitted that applicants' present claims 1 and 5 are patentably distinguishable over Wei in view of Yokoyama et al.

Withdrawal of the 35 USC 103 rejection is thus respectfully requested.

Reconsideration is requested. Allowance is solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,

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